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Air Force energy demand, in concert with the growing economic and environmental concerns the U.S. continues to face, calls for a sustainable energy culture inherent in every mission and at every level of the Air Force organization. The Air Force organization has experienced and highly skilled Airmen, innovative process improvement programs, and a strategic framework to initiate an energy culture change. The energy investment focus has overshadowed the need for an energy culture change to sustain the energy initiatives and create a lasting energy vision for the future. The Air Force must reorganize the installation level energy program, moving the base energy manager to the Wing Staff, and empower the base energy manager with the authority and personal systems approach skills to influence an energy culture change at the installation level. With the base energy manager on their Wing Staff, the Wing Commander can better communicate, provide support, and reinforce the strategic energy vision to the Airmen. Understanding the effects of Airman's decisions on the Air Force energy system can influence a positive energy culture change in the Air Force.

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MASTER OF MILITARY STUDIES

# Energy Culture in the Air Force: Installation Energy Management Reorganization

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

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## *Executive Summary*

**Title:** Energy Culture in the Air Force: Installation Energy Management Reorganization

**Author:** Major Eric E. Rollman, United States Air Force

**Thesis:** Energy program reorganization at the installation level can influence a positive energy culture change in the Air Force.

**Discussion:** The Air Force will continue to have a high demand for energy to support the infrastructure, technologies, and growing mission requirements throughout the world. Air Force energy demand, in concert with the growing economic and environmental concerns the U.S. continues to face, calls for a sustainable energy culture inherent in every mission and at every level of the Air Force organization. The Air Force organization has experienced and highly skilled Airmen, innovative process improvement programs, and a strategic framework to initiate an energy culture change. Change theorists, over several decades, have researched and studied the process of culture change and how leadership, management and social systems affect organizational culture. The personal systems approach to culture change considers how every Airman contributes to the Air Force organization and is a valuable approach to influencing an energy culture change in the Air Force. The Air Force has invested in energy program initiatives and projects to realize energy efficiencies and cost savings for the DOD. This investment focus has overshadowed the need for an energy culture change to sustain the energy initiatives and create a lasting energy vision for the future.

**Conclusion:** The Air Force must reorganize the installation level energy program, moving the base energy manager to the Wing Staff, and empower the base energy manager with the authority and personal systems approach skills to influence an energy culture change at the installation level. Every Wing Commander must be committed to their installation energy program. With the base energy manager on their Wing Staff, the Wing Commander can better communicate, provide support, and reinforce the strategic energy vision to the Airmen. By reorganizing the installation energy program, the base energy manager can separate the key responsibility of energy culture change from the technical responsibilities of the functional managers to execute energy projects and initiatives. The base energy manager can stimulate energy culture change by focusing on the personal system that affects the Air Force energy program. Each and every Airman plays a vital role in the energy program. Understanding the effects of these decisions on the Air Force energy system can influence a positive energy culture change.

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## *Preface*

The United States Air Force (USAF) leads the Department of Defense (DOD) in energy consumption, due to the heavy fuel requirements of airlift. The Air Force also leads in energy conservation efforts with renewable energy. The focus on energy in the Air Force can not be overstated and the strategic guidance in the Air Force places great emphasis on energy. My experience in the Air Force as a Civil Engineer Officer has given me the chance to see energy initiatives change the way Airmen accomplish our mission. My experience has also led me to recognize that our energy vision requires a culture change to reach that vision. The program leaves the energy culture to chance given the current Air Force focus on energy project goals. My goal is to highlight the need for a shift in the energy program to focus on the social aspect of the energy culture to realize lasting change and energy success in the Air Force. This paper will discuss the USAF energy culture in relation to infrastructure programs with the understanding that energy culture will impact fuel consumption and efficiency programs similar to the infrastructure programs within the Air Force organization.

***Introduction***

The United States Air Force (USAF) is the largest consumer of energy within the Department of Defense (DOD), and the DOD is the single largest consumer in the United States. The Air Force spent roughly $9 billion on fuel in Fiscal Year (FY) 2008, most of which contributing to aviation.[1] The demand for USAF capability continues to increase while the cost of energy supply and volatility of the energy market exacerbate our shortage of funding. Energy security does not necessarily refer to the shortage of supply; rather, energy security revolves around the global energy market and the geopolitics of supply and demand.[2] The importance of the U.S. energy posture is not a new issue and the Air Force, along with the other services, has programs to improve our energy situation. However, success of our energy programs relies on the motivation and commitment of our Airmen, Soldiers, Sailors, and Marines. This paper will describe how energy program reorganization at the installation level can influence a positive energy culture change in the Air Force.

***Current Air Force Energy Environment***

The current Air Force energy campaign consists of policies and programs to reduce demand, increase supply and change the culture through goals, objectives and metrics in accordance with energy policy and guidance.[3] The Air Force implements energy demand reduction through many programs intended to affect energy consumption through both conservation and efficiencies in mission accomplishment and construction practices. The Air Force increases supply through renewable energy and alternative fuel programs. Lastly, the Air Force intends to change the energy culture through education and awareness. The numerous energy initiatives focus in three main areas: aviation fuel, ground fuel, and installation energy.

When the Committee on Armed Services met in 2008 to discuss the defense energy posture, the hearing centered on the energy supply and demand environment, spending no time discussing the energy culture and how to affect change in our Soldiers, Sailors, Marines and Airmen.[4] The Government Accountability Office (GAO) did; however, highlight the need for top level leadership and strategic guidance to guide our forces on energy, noting that the Air Force was the one exception that did employ leaders with the primary responsibility in energy mobility efforts within their service.[5] The organizational framework in the Air Force, along with the 2010 Energy Plan, provides a strategic framework for energy culture change.

The Air Force is concentrating on energy savings for multiple reasons. The first reason is fiscal responsibility to American taxpayers. The U.S. spends billions of American taxpayers' dollars on energy to power our military force, whether it be fuel for aviation, ships, tactical vehicles or electricity to power our installations. The Air Force is preparing to contribute to the DOD's $100 billion in energy efficiencies with $33 billion in energy initiatives over five years to support U.S. budget cuts.[6] Another obvious reason for saving energy in the military is to positively contribute to the world environment by conserving our natural resources and reducing the harmful effects of carbon emissions on the environment. With the majority of the Air Force energy consumption in aviation and fuels, the issue of U.S. oil reserves and dependence on foreign reserves is of the utmost concern to U.S. economic and foreign policy. An additional consideration involves USAF contributions to new energy technologies to further develop efficiencies that can benefit the domestic market. Following World War II, for example, the military was the leading expert in the nuclear field, which ultimately led to the peaceful applications of nuclear energy.[7] With that said, the Air Force must also look to the commercial sector to levy ideas and technologies already in use to take advantage of savings wherever

possible in the military. The use of thermal energy storage systems for facility cooling is a good example of how the Air Force is utilizing current commercial technologies. Thermal energy storage is the method of using a facility chiller system[8] to create ice in a storage tank during off-peak energy consumption (i.e. during nighttime hours). During peak energy consumption, or hot summer days, rather than producing ice the chiller uses the stored ice to more efficiently cool the re-circulating water, using less energy. This method saves both energy as well as utility costs by conserving energy during discounted off-peak rates. While the Air Force strategy promotes energy projects and initiatives, the civil engineer squadron executes this energy strategy at the installation level.

The Air Force civil engineer squadron manages the installation energy program in accordance with the Air Force energy strategy. The Air Force currently affects energy culture by executing program objectives and metrics centered on the fulfillment of energy policy directives. The installation energy program centers on energy conservation through green design, utilization of green technology and energy efficiencies in facility maintenance and operations. Energy conscious operations of facilities and infrastructure can improve the energy situation through both reduced demand and increased supply; however, the focus on executing programs to fulfill a policy objective ignores the need to improve and sustain a positive energy culture. Base level energy managers contribute to energy awareness primarily through the October Energy Awareness Month campaign mandated by higher headquarters. Energy awareness month communicates the importance of energy initiatives and reinforces Air Force energy awareness messages. Base energy managers take advantage of the opportunity in October to highlight energy initiatives and programs on the base to gain awareness and involvement from the base populace.

The Energy Policy Act of 2005 mandated that all federal facilities must be equipped with electric meters to monitor electricity consumption by October 1, 2012.[9] Meter installation is a prerequisite step for many infrastructure energy initiatives. As energy managers gather data on not only electric, but also gas and water consumption, they can utilize this database to determine problem areas in the base infrastructure and pinpoint energy saving opportunities. Metrics drive action in many organizations and the Air Force is no exception. Air Force leaders recognize the importance of energy metering and its importance to energy metrics. Energy managers can easily track these metrics from their desk by utilizing the local area network (LAN). Today's technology allows energy managers to connect the utility meters to the LAN with their own internet protocol (IP) address to track the energy consumption down to the source facility. Air Force bases are nearing completion of meter installations on existing facilities and project managers are changing construction guidelines to ensure projects incorporate compatible meters into future construction to maintain base energy tracking capabilities. Air Force bases are beginning to focus on gathering energy data to track facility energy consumption and cost metrics. Once all meters are operational and bases begin to develop a baseline for energy consumption, energy managers can begin to identify trends in consumption to focus initiatives on problem facilities and/or problem organizations.

The Air Force Energy Plan includes culture change as a pillar in the energy program. The plan tasks the Culture Change Working Group to "Make Energy a Consideration in All We Do" through education and training; awareness and communication; and measurement, management, awards and incentives.[10] This working group, organized under the Energy Senior Focus Group, works at the Secretary of the Air Force Headquarters Air Force (SAF/HAF) staff level and focuses efforts on energy awareness through strategic communications. Likewise, the

Strategic Communications Working Group works at the SAF/HAF level to maintain a coordinated communications message across the mission areas of the Air Force and also maintain the ability to target mission areas as appropriate. The department's formation of these working groups is a step toward a focused energy culture change. The top down approach outlined by SAF/HAF will have little effect if energy program implementation at the installation level remains focused on project management and execution. The Air Force environment challenges leaders to influence the highly trained and technically inclined Airmen to consider energy in their day to day mission responsibilities.

### *Culture Change Philosophies*

To begin to understand methods of culture change, a leader must first agree on what organizational culture is. Dr. Kim Cameron described organizational culture as the ideologies valued which define how to achieve success in an organization, or more simply put, "how things are around here."[11] As defined by Dr. Edgar Schein in *Organizational Culture and Leadership*, group culture is

> a pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.[12]

Focusing these definitions on the subject of the Air Force energy culture, the Air Force must shape the shared values of the institution and how Airmen perceive and act on energy issues or initiatives in order to change the energy culture in the Air Force.

When considering energy culture change, the Air Force must orient its philosophy to a personal systems approach. Air Force leaders must recognize that each Airman contributes to the energy system, and no matter how small, each individual energy decision contributes to the

energy system as a whole. As Peter Senge explains in *The Fifth Discipline*, "The real leverage in most management situations lies in understanding dynamic complexity, not detail complexity."[13] A leader's understanding of dynamic complexity is to recognize the interrelationships and processes of change that each Airman brings to the complex problem. The large decision points on a commander's mind are the high dollar projects, programs and unit missions. Project procurement and execution consume a majority of the leader's attention. On the surface, the energy projects seem to be the complex systems requiring our attention; however, the Airman's interaction with this new system and how that Airman influences others and the mission is the real complexity. Energy program leaders can leverage the Airman's interaction with the energy process, or dynamic complexity, rather than focus only on project execution, or detail complexity, to more effectively inhibit energy culture change.

The Air Force leader has different change strategies to consider within the human systems approach to tailor culture change to the Air Force environment. Three broad types of change strategies include empirical-rational, normative-re-educative, and power-coercive approaches.[14] Each of these approaches has application value for Air Force culture change. The human environment tailored for an empirical-rational approach has a knowledge base to allow reasonably guiding decisions needed for change, considering the individual knowledge base. The normative-re-educative approach, on the other hand, considers the social factors of an organization that guide decisions on a much more personal level and henceforth will be referred to as the "change by example" approach. The power-coercive approach, as the name implies, relies on a forced change through a variety of coercive tactics, whether it be policy, economic or moral persuasion. Considering these three categories of change strategy, the leader for change must endeavor to create a lasting behavior change that permeates throughout the organization.

For example, coerced behaviors do not persist unless the organization has realized a cognitive change.[15] With the complexity of the Air Force organization and diversity of technical expertise within the organizational structure, Air Force leaders would have difficulty applying just one of these strategies for successful cultural change. Considering the different contributing factors of the Air Force organization, the Air Force must implement a modified strategy using elements of each of these approaches to change.

Air Force leaders must use appropriate management skills to implement effective strategies for change. The expertise and diversity of Air Force personnel and the structure in the Air Force military organization present a basis for two management practices to work well. The hierarchy and adhocracy culture types closely describe the current culture of the Air Force. Hierarchy management skills focus on a guided mission and standards in the organization, controlling performance through accountability and coordinating actions within as well as sharing information outside the organization. Adhocracy management skills focus on encouraging innovation, creativity, and ideas; communicating the future vision of the organization; and encouraging continuous process improvement for efficiency and productivity in the organization.[16] Used consistently in conjunction with change processes and programs, these management skills will reinforce sustained behaviors in Airmen.

### *Air Force Specialty Culture*

Every military Airman enters into service under a very specialized functional area, which defines the technical training they will receive and the Air Force Specialty Code (AFSC) they continue to train under for their time in the Air Force. These functions include fields specific to engineering such as surveying; electrical; water and fuel systems maintenance; entomology;

heating, ventilation and air conditioning; fire and emergency services; and emergency management; as well as highly technical fields outside engineering in air, space and nuclear mission sets. Unless an Airman applies and receives a waiver to cross-train into another specialty, they continue to receive training along that narrow career path as they advance in rank. The Air Force entrusts enlisted and commission Airmen alike with considerable levels of responsibility within their field of expertise considering the high level of specialized training they receive in that specialty. This highly technical culture of the Air Force provides a knowledge base in Airmen that differs from that of the Army and Marines and is an important consideration in how leaders can affect change in Airmen and how the Airmen will perpetuate change throughout the organization. Many of these AFSCs, especially in engineering, also provide a ready avenue for influencing the energy culture at the social level through change by example.

The AFSC factor is an important human element for shaping the energy culture. Air Force Instructions and operating procedures offer the opportunity for the Air Force to shape AFSCs specific to their functional interaction with energy in their missions. Technical training schools for these AFSCs also provide a superb time to educate Airmen entering the Air Force on the energy culture pertaining to their career field. This element of the Air Force environment compliments the current objectives in our energy program to change the energy culture through training and awareness and is conducive to the empirical-rational change approach. In addition to energy training that the Air Force tailors specific to each AFSC, there is also general energy awareness training required for all Airmen to build a foundation of knowledge. This ancillary training requirement serves the Air Force just as information security or equal employment opportunity training is a mandatory requirement for every Airman.

***Learning Organization***

The diversity of Air Force personnel: civilian and military, young and old, experienced and eager for knowledge, provides a dynamic environment for a learning organization. A learning organization is "an organization that is continually expanding its capacity to create its future."[17] Leaders must be aware of both the advantages and disadvantages presented by diversity. Diversity in personality and experience improves the creativity and quantity of ideas generated within an organization. Younger personnel bring a new perspective and more current cultural values and experiences to the organization. Likewise, military personnel bring a broad level of experience based on their different assignments, while civilians bring continuity and professional knowledge to the mission. Even though experience is required to be successful, it often presents a barrier to new ideas and change. Older and more experienced personnel often resist change, preferring old processes over learning new ways of doing business. More senior civilians also resist change for fear it will require more training for them as well as hands on instruction for military Airmen that will take time away from mission accomplishment. For culture change to be effective, the Air Force needs commitment from all members: young, old, civilian, and military personnel alike.

Air Force leaders can take advantage of this diverse organizational environment with programs that encourage creativity and expanding organizational success. Two programs in the Air Force that encourage change and creativity are the Air Force Smart Operations for the Twenty-First Century (AFSO21) and Innovative Development through Employee Awareness (IDEA) programs. AFSO21 aims at continuous process improvement with the goal to instill the desire in all Airmen to improve Air Force processes and eliminate waste in mission accomplishment.[18] The AFSO21 program incorporates requirements for unit representatives,

training, and empowering them to lead the program implementation at the unit level. Organizational representatives encourage units to analyze their mission processes and execute AFSO21 projects where process improvement and problem solving steps can improve efficiency and effectiveness. The IDEA program also focuses on process improvement and efficiency by using incentives to solicit participation from military and civilian personnel.[19] Personnel can present submissions for process improvement within or outside their career field. Once approved, the IDEA analyst calculates monetary savings for the submission to determine whether the submitter is eligible for an award. Participants are eligible for awards ranging from $200-10,000 based on a percentage of total estimated savings.[20] The AFSO21 and IDEA programs both elicit active participation in process improvement throughout the ranks of the Air Force organization. If Air Force personnel actively accept and implement both programs to their full potential, these adhocracy management tools offer a valuable means to gain buy-in and commitment to new energy processes and initiatives.

Programs like AFSO21 and IDEA also offer an environment of participative and reflective openness, which contribute to a learning environment.[21] Much like an open door policy for employees to bring their concerns to the boss, leaders must be open to new ideas to have an effective learning organization. Personnel display participative openness by taking part in open communication of ideas up the chain and creating an environment for an empirical-rational approach to change. For this to take place, leaders must take part in reflective openness, or the act of reflecting on their own ideas to be accepting of new ideas and change. Reflective openness also refers to those presenting new ideas, suggesting that they look inward at their idea and accepting that they may be wrong and be open to rejection.[22] This level of openness in an

organization encourages continued process improvement and a learning environment where participants are less likely to become discouraged and resist participation.

Commitment is vital to a successful learning organization. The foundation for commitment is a positive vision, or one that embodies aspiration for continued success and growth.[23] Guided by a clear and positive mission, a leader must also establish a favorable environment for enrollment. Senge describes enrollment as a person's freedom of choice to commit to a process or activity.[24] It is often difficult for a military organization to grasp this fundamental aspect of commitment. The military functions using a command and control structure of rank, standards, and a directive approach to mission accomplishment. Although leaders use various approaches other than the power-coercive approach in day to day mission accomplishment, subordinates are required to carry out lawful orders when administered. This order driven approach describes subordinate compliance as opposed to commitment to the mission. The idea of commitment supports the GAO recommendation for an organizational framework developed exclusively for energy change. Leaders dedicated and focused on the energy issues will perpetuate a clear and positive vision and be enrolled themselves in that vision. If the leaders are committed to the vision, they provide the favorable environment that Senge describes, encouraging subordinate commitment. Commitment is also an infectious behavior in an organization and produces a social environment favorable to the "change by example" approach. As Airmen see their leader's commitment and enroll in change, other Airmen and subordinates will likewise enroll, influencing commitment down the organizational structure.

***Energy Culture Change***

The Air Force must reorganize the energy program to enable effective management styles and change strategies considering the existing environment and the complex Air Force social system. The strategic level of the Air Force energy program has a positive vision for energy culture change that SAF down to each Air Force installation will embrace. The 2010 Air Force Energy Plan provides clear guidance; however, the Air Force must reorganize the program to develop that vision at the installation level using a change process focused on the personal systems approach and the tools and programs the Air Force currently possesses. The Air Force must empower the installation energy manager and redefine the management responsibilities for the base level organization.

Given a clear vision focused on culture change the installation managers must use the systems approach to gain the commitment of every Airman. Every installation energy plan is the Wing Commander's plan. The installation energy manager must work directly for the Wing Commander to execute the proper authority over and coordination with all other units in the Wing. The current structure places the program manager in the civil engineer squadron. With this organizational structure, the energy manager is responsible not only for the Wing energy program, but also the planning, programming and execution of energy projects within the civil engineer squadron. In a 1995 survey, only 25 percent of DOD energy managers reported energy management as their primary duty.[25] Though base energy programs are presently receiving more attention and this data has improved, energy managers employed in the engineer squadron still devote a majority of their efforts toward project execution, despite the need for a personal systems approach to influence the base population. Buried in this organizational structure,

energy managers lack influence and authority over base-wide energy users and require higher level support.[26]

Increasing Wing Commander support is not enough. The Air Force must employ the base energy manager on the Wing Staff to grant them the authority needed for coordination among all base units and to better influence the entire base populace. The base energy manager would still be required to work hand-in-hand with the civil engineer energy manager for project planning, programming, and execution. With more authority, the base energy manager can more effectively coordinate with unit energy representatives to facilitate energy initiatives and improve Airmen participation in energy events, training, and awareness by utilizing base marketing and education resources. This reorganization requires leaders to appoint unit energy representatives to distribute the energy focus across the base organization. These assignments would be additional duties for existing employees with guidance from the base energy manager.

Organized in the Wing Staff, energy managers can allocate their time and resources to understanding the social system and how Airmen influence energy decisions across the organization. This level of authority would also place them on an equal or higher level with AFSO21 and IDEA program managers who would work closely with the energy manager using adhocracy skills to influence base participation and process improvement. The reduced project management responsibility, combined with heightened authority, allows the energy manager total commitment of effort toward energy culture change. The energy manager can accompany units in their AFSO21 projects to promote energy efficiencies within their unit processes while teaching Airmen and demonstrating leadership's commitment to the energy program. In order to promote the hierarchy management skills necessary to change the energy culture, the Air Force must provide the energy manager with training in energy programs, systems management, and

change theory alike to improve their effectiveness as a manager of change.[27] Change systems training will add a valuable set of skills that energy managers need to broaden their abilities to include both energy programs and social systems techniques for change. Energy managers can influence Airmen commitment by understanding the dynamic influence each Airman imparts on the energy system.

The Wing Commander is the pinnacle leader for the base, communicating Air Force strategic guidance down to the lowest levels of the organization. Therefore, the Wing Commander must actively chair the Energy Management Steering Group (EMSG), which the base energy manager facilitates. Commitment from unit level energy managers is not possible without the true commitment of the Wing Commander. The commander demonstrates commitment by example. Leaders must consistently communicate a clear message through their systematic attention and behavior.[28] Face-to-face interaction with the EMSG will help garner a true commitment from the Wing Commander and communicate a message of dedication to Airmen using the "change by example" approach. Lastly, by chairing the EMSG, the Wing Commander can better understand program initiatives, relate energy program initiatives to unit mission requirements, and advocate higher headquarters support and resources when needed. By leveraging Wing Commander power at the base level, the Air Force energy program and energy managers, supported by the Wing Commander, can more effectively solicit participation at the unit level and generate commitment to the energy program.

A commonly observed example of non-commitment under the current Air Force energy program construct involves the base heating and cooling schedule, common to installations that experience seasonal weather changes. Based on seasonal temperature averages and estimates, a base energy plan or policy (signed by the Wing Commander) specifies the date when base

engineers winterize summer cooling systems and prime winter heating systems for operation. This energy plan technique can save cooling and heating costs during periods when expected outside temperatures provide comfortable working conditions for mission accomplishment without facility cooling or heating system operations. Often, Wing Commanders are the first to deviate from the energy plan when the weather does not cooperate and outside temperatures cause the facility temperature to fluctuate outside the comfortable range. Whether influenced by a distinguished visit, an important event, or merely the privilege of rank, deviation from the base energy plan de-emphasizes the importance of the energy program. Excluding extremes that would justify immediate action, this behavior not only demonstrates a lack of commitment to energy conservation, but shows the base populace and potential distinguished visitors alike that energy program commitment exists only when convenient.

Unit energy representatives can and should implement energy program initiatives at the unit level. Efficiency initiative projects specific to unit missions require a level of expertise that only exists at the unit level. Proposed management changes would task the base energy manager with implementing energy initiatives, while unit level representatives handle the execution and project management. The base energy manager would then concentrate on influencing the social system to gain Airmen participation in the change process and gain the enrollment of the Airmen in the implementation process. The energy manager must work with unit representatives to gain mutual understanding on how the energy initiatives help the organization and how individual levels of effort influence the system and affect the process on a larger scale. The energy manager can create energy culture change by educating unit members during the evolution of energy initiatives and communicating the desired beliefs and values associated with the energy initiatives.[29] While the unit representative concentrates on the technical applications and

execution of the energy initiative, the energy manager dedicates efforts toward the social aspect of energy culture change. Unit personnel must be educated on how their personal contributions to the unit mission impart an energy footprint that has effects beyond their unit perspective. Unit representative participation can relieve the energy manager of technical application responsibilities to focus on enlightening Airmen on the value of their personal contribution to gain their commitment. Whether the energy manager participates at the unit level in the context of a large energy project initiative in conjunction with the unit representative or speaks at a unit or base function to advocate participation in day to day energy conservation, relating individual actions to its effects on the Air Force system is required for energy culture change.

The Civil Engineer Squadron's role in the energy program is paramount. Though this reorganization proposal places the base energy manager outside the engineer unit, the civil engineer unit representative is instrumental to ensure success with the energy program and energy culture change. The Air Force energy program requires technical expertise for civil engineer project and program execution. Three examples vital to the energy system that highlight the importance of civil engineering involvement include energy metering, Energy Conservation Investment Program (ECIP), and "green"[30] construction.

The Air Force has nearly completed the incorporation of energy meters on Air Force installations. Energy meters alone cannot save energy, but provide a valuable tool to educate leaders and provide energy managers with the data to save energy through resourceful initiatives based on consumption data collected.[31] As discussed previously, the civil engineer energy representative carries the responsibility to track energy consumption in facilities to observe trends and incorporate energy projects where savings are possible. The link to the social energy system is missing in the energy meter initiative directed by the Energy Policy Act of 2005. The

proposed reorganization affords the energy manager the resources (training, authority, and social awareness) to consider the applications of the energy meter initiative to the social energy system. Social applications can include motivational contests or award initiatives to units that reduce energy consumption over time or incentives to implement energy savings initiatives for facilities based on cost savings over time. As the civil engineer gathers meter data and isolates spikes or trends in data, the base energy manager can utilize this negative, or red, metric data to work with unit representatives to encourage creative energy savings solutions. Leaders must exploit the red metrics to realize energy savings benefits from the meter program. As discussed by Colonel Paul McAneny in his research on transformational changes in aircraft maintenance, the Air Force must change from a "green is good" mentality to one of "red is good" to realize long term improvements.[32] As leaders gain this mentality with regard to metrics, they will welcome the problem areas as opportunities to gain energy efficiencies and take action on those opportunities for improvement. Positioned in the Wing Staff, the base energy manager can liaison between the civil engineer squadron and Wing Commander to help foster this "red is good" attitude to facilitate continuous process improvement using AFSO21 in base facilities and unit missions.

The Air Force currently plans to execute 12 ECIP construction projects valued at $34 million using Fiscal Year 2011 funds.[33] The ECIP program executes projects to improve existing facilities or infrastructure to achieve more energy efficiency and cost savings. The civil engineer energy representative plays the fundamental role in planning and programming ECIP projects; however, the base energy manager would follow through with implementation to train and educate the end users to properly utilize the technological advances to their full energy and cost saving potential. While end user training is crucial, the most important step for energy culture change lies with the base energy manager's ability to educate the end user on how their

actions affect Air Force cost savings and the energy system as a whole. Leaders may experience resistance to process changes incurred with ECIP projects. The base energy manager's position of authority and ability to understand unit missions and the ECIP project will help to positively influence unit behaviors.

Very similar to ECIP projects, green construction requires follow through with the end user to attain the most in energy efficiencies and cost savings. New green construction differs from ECIP in that the new facility construction will likely change the way the end user approaches and accomplishes the mission. Whether it is drastic changes to operating procedures or the incorporation of technological efficiencies, user commitment is a high priority. The base energy manager can begin to establish user commitment in the design stage. Through close cooperation with the engineer squadron during design, the base energy manager can facilitate customer inputs for energy efficiencies and green technology. The DOD must ensure that new construction incorporates the Guiding Principles defined in the 2006 Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding.[34] One of those Guiding Principles is the Leadership in Energy and Environmental Design (LEED) system, which is a national certification developed in 1998 to promote green building design.[35] The base energy manager should facilitate and participate in the LEED initiatives early in the development process. During design, the base energy manager, engineers, appropriate unit representatives, and facility users should not only consider renewable energies, such as solar power, or energy efficient lighting; the design team should also consider how the user can change mission activities to shorten process time, reduce energy consumption, and eliminate waste through innovation and facility layout. While the designers and engineers concentrate on the technical aspects of the project design, the base energy manager must focus on customer participation,

understanding, and commitment to energy initiatives. Current energy managers organized in the civil engineer squadron limit their focus to the technical side of energy innovation and do not have the time or training to devote their resources toward customer commitment to energy culture change.

With these proposed changes to the base energy manager position, the Air Force will experience very little change with regard to the energy position located in the civil engineer squadron. The engineer energy representative will retain their responsibilities to plan, program, and execute energy initiative projects; document energy meter data; implement strategic energy goals associated with utilities and infrastructure; and report on base infrastructure energy improvements and initiatives. In addition to the new base energy manager position inheriting the responsibility to lead the energy program and spearhead Energy Awareness Month, this new position would assume a role in personal systems change, a new task unique to the Air Force installation energy program. This new personal systems approach compliments the culture change pillar in the 2010 Air Force Energy Plan and fills the gap in the Air Force installation energy program. The base energy manager's duties defined in this reorganization deliberately highlight the social aspect of the energy system as a means to shape and change the behaviors of our Airmen to commit to the Air Force energy vision and align with the SAF/IE strategic goals. Empowered base energy managers, equipped with social systems skills and leading installation energy programs across the Air Force, would place a priority on energy culture change that is non-existent in the Air Force today.

***Conclusion***

Even though the 2010 Air Force Energy Plan calls for a culture change with the vision to "Make Energy a Consideration in All We Do," the current base level structure and focus for the energy program is insufficient.[36] The Air Force must reorganize the installation level energy program, moving the base energy manager to the Wing Staff, and empower the base energy manager with the authority and personal systems approach skills to influence an energy culture change at the installation level. The Air Force will continue to have a high demand for energy to support the infrastructure, technologies, and growing mission requirements throughout the world. Air Force energy demand, in concert with the growing economic and environmental concerns the U.S. continues to face, calls for a sustainable energy culture inherent in every mission and at every level of the Air Force organization.

The Air Force organization has experienced and highly skilled Airmen, innovative process improvement programs, and a strategic framework to initiate an energy culture change. Change theorists, over several decades, have researched and studied the process of culture change and how leadership, management and social systems affect organizational culture. The personal systems approach to culture change considers how every Airman contributes to the Air Force organization and is a valuable approach to influencing an energy culture change in the Air Force. The Air Force has invested in energy program initiatives and projects to realize energy efficiencies and cost savings for the DOD. This investment focus has overshadowed the need for an energy culture change to sustain the energy initiatives and create a lasting energy vision for the future.

Every Wing Commander must be committed to their installation energy program. With the base energy manager on their Wing Staff, the Wing Commander can better communicate,

provide support, and reinforce the strategic energy vision to the Airmen. By reorganizing the installation energy program, the base energy manager can separate the key responsibility of energy culture change from the technical responsibilities of the functional managers to execute energy projects and initiatives. The base energy manager can stimulate energy culture change by focusing on the personal system that affects the Air Force energy program. Each and every Airman plays a vital role in the energy program. Whether a personnel administrator leaves the office lights on, increasing energy consumption in that facility, or a pilot over runs the engines on a cargo aircraft while on the taxiway, wasting expensive jet fuel, each individual energy decision contributes either positively or negatively to the cycle of energy consumption. Understanding the effects of these decisions on the Air Force energy system can influence a positive energy culture change. More energy consumption results in less energy security for the U.S. and less funding for the DOD to allocate toward mission requirements. The Air Force must invest in the energy culture change at the installation level to see positive changes in energy consumption across the Air Force organization.

## *Endnotes*

[1] Assistant Secretary of the Air Force for Installations, Environment and Logistics, *Air Force Energy Plan 2010* (Washington, DC: Secretary of the Air Force Installations, Environment and Logistics, 2010), 4, http://www.safie.hq.af.mil/ shared/media/document/AFD-091208-027.pdf (accessed January 3, 2012). Cited hereafter as SAF/IE, "Energy Plan 2010."

[2] Jan H. Kalicki and David L. Goldwyn, *Energy and Security: Toward a New Foreign Policy Strategy* (Washington, DC: Woodrow Wilson Center Press, 2005), 51.

[3] United States Air Force, *Energy Management*, Air Force Instruction 90-1701 (Washington D.C.: United States Government Printing Office, July 16, 2009), 13, http://www.e-publishing.af.mil/shared/media/epubs/AFI90-1701.pdf (accessed January 3, 2012). Cited hereafter as AFI 90-1701.

[4] Henceforth, "Airmen" refers to all military and civilian Air Force employees.

[5] U.S. Congress. House. Committee on Armed Services. Readiness Subcommittee, *Department of Defense Energy Posture* (110th Cong., 2nd sess., March 13, 2008), 90-94, Cited hereafter as Committee on Armed Services, "Energy Posure."

[6] Titus Ledbetter III, "Air Force Confident In Ability To Find Additional Energy Efficiencies," *Inside Defense* (October 26, 2011). www.InsideDefense.com.

[7] Vikram Janardhan and Bob Fesmire, *Energy Explained: Volume 1, Conventional Energy* (Plymouth, UK: Rowman & Littlefield, 2011), 197.

[8] A chiller is a form of heating, ventilation and air conditioning system that runs chilled water through coils or heat exchangers to cool the air in a facility with recirculation of the water back through the closed system for re-cooling.

[9] U.S. Congress. House and Senate, *Energy Policy Act of 2005* (109th Cong., 1st sess., January 4, 2005), 15 (Sec. 103), http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_bills&docid=f:h6enr.txt.pdf (accessed December 19, 2011). Cited hereafter as Energy Policy Act 2005.

[10] SAF/IE, "Energy Plan 2010," 13-14.

[11] Kim S. Cameron and Robert E. Quinn, *Diagnosing and Changing Organizational Culture: Based on the Competing Values Framework* rev. ed. (San Francisco, CA: Jossey-Bass, 2006), 16.

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[13] Peter M. Senge, *The Fifth Discipline* (New York: Currency Doubleday, 1990), 72.

[14] Warren G. Bennis, Kenneth D. Benne, Robert Chin and Kenneth E. Corey, *The Planning of Change*, 3rd ed. (New York: Holt, Rinehart and Winston, 1976), 23.

[15] Schein, 325.

[16] Cameron, 120-121.

[17] Senge, 14.

[18] U.S. Air Force, *Specialty Management, Implementing AFSO21 Initiatives*, Air Force Materiel Command Instruction 90-104 (Washington, DC: United States Government Printing Office, November 16, 2011), 3, http://www.e-publishing.af.mil/ shared/media/epubs/AFMCI90-104.pdf (accessed January 5, 2012), Cited hereafter as AFMCI 90-104.

[19] U.S. Air Force, *Manpower and Organization, The Air Force Innovative Development Through Employee Awareness (IDEA) Program,* Air Force Instruction 38-401 (Washington, DC: United States Government Printing Office, November 21, 2007), 5, http://www.e-publishing.af.mil/shared/media/epubs/AFI38-401.pdf (accessed January 13, 2012), Cited hereafter as AFI 38-401.

[20] AFI 38-401, 20.

[21] Senge, 276-277.

[22] Senge, 277.

[23] Senge, 225.

[24] Senge, 218.

[25] Jeffrey A. Drezner and Melissa Bradley, *Survey of DOD Facility Energy Management Capabilities* (Washington, DC: RAND's National Defense Research Institute, 1998), 43.

[26] Drezner, 71.

[27] Cameron, 128.

[28] Schein, 246-247.

[29] Schein, 225.

[30] Green or sustainable construction refers to facility construction projects that incorporate energy efficient technology such as solar panels and construction materials produced and/or operated environmentally friendly and made with recycled or reused materials. Sustainable construction is, "to create and maintain conditions, under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations of Americans." From President, Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management," *Federal Register*, 72, no. 17 (January 26, 2007): 3922-3923, Cited hereafter as EO 13423.

[31] Larry Strother, "Monitoring Energy Use With Meters," *Air Force Civil Engineer* vol 16, no 3, (2008), 13, http://www.dtic.mil.

[32] Paul J. McAneny, *Red is Good: Transformational Changes for US Air Force Aircraft Maintenance* (Maxwell AFB, AL: Air University Press, October 2009), 13.

[33] Gabe Starosta, "DOD Moving Forward On 56 Energy Conservation MILCON Projects," *Inside Defense* (October 6, 2011). www.InsideDefense.com.

[34] EO 13423, 3919.

[35] Vikram Janardhan and Bob Fesmire, *Energy Explained: Volume 2, Alternative Energy* (Plymouth, UK: Rowman & Littlefield, 2011), 196.

[36] SAF/IE, "Energy Plan 2010," 1.

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